

U.S. Patent Application 09/965,740
Response to Restriction Requirement

Listing of the CLAIMS:

1. (currently amended): A material for absorbing biological fluids, comprising a flexible substrate and an enhanced surface [[area]], said enhanced surface [[area]] comprising a ~~multitude of non-hydrolyzable, non-leachable polymer of antimicrobial monomeric moieties chains covalently bonded by non-siloxane bonds to said flexible substrate so as to be[;]] wherein said non-hydrolyzable, non-leachable polymer chains comprises a multitude of antimicrobial groups attached to said non-hydrolyzable[,,] and non-leachable polymer chains by covalent bonds;~~ and wherein a sufficient number amount of said non-hydrolyzable, non-leachable polymer chains are is covalently bonded to ~~sites of~~ said flexible substrate to render the material antimicrobial when exposed to aqueous fluids, menses, bodily fluids, or wound exudates.
2. (currently amended): The material of claim 1, wherein said antimicrobial groups monomeric moities comprise at least one quaternary ammonium structure.
3. (currently amended): The material of claim 1, wherein said antimicrobial groups monomeric moities comprise at least one non-ionic structure.
4. (original): The material of claim 3, wherein said at least one non-ionic structure comprises a biguanide.
5. (currently amended): The material of claim 1, wherein said non-hydrolyzable, non-leaching polymer chains have has an average degree of polymerization of about 10 to 100.
6. (original): The material of claim 1, wherein said material comprises all or part of a wound dressing, sanitary pad, a tampon, an intrinsically antimicrobial absorbent dressing, a diaper, toilet paper, a sponge, a sanitary wipe, isolation and surgical gowns, gloves, surgical scrubs, sutures, sterile packaging, floor mats, lamp handle covers, burn dressings, gauze rolls, blood transfer tubing or storage container, mattress cover, bedding, sheet, towel, underwear, socks, cotton swabs, applicators, exam table covers, head covers, cast liners, splint, paddings, lab coats, air filters for autos planes or HVAC systems, military protective garments, face masks, devices for protection against biohazards and biological warfare agents, tumber, meat or fish packaging material, apparel for food handling, or paper currency, and other surfaces in need of a non-leaching antimicrobial

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property.

7. (original): The material of claim 1, wherein said flexible substrate is comprised, in whole or in part, of cellulose, or other naturally-derived polymers.

8. (currently amended): The material of claim 1 wherein said flexible substrate is comprised, in whole or in part, of synthetic polymers ~~including, but not limited to: polyethylene, polypropylene, nylon, polyester, polyurethane, or silicone.~~

9. (original): The material of claim 1, wherein said attachment of said non-hydrolyzable, non-leachable polymer to said flexible substrate is via a carbon-oxygen-carbon bond, also known as an ether linkage.

10. (original): The material of claim 9, wherein a cerium-containing catalyst catalyzes formation of said ether linkage.

11. (currently amended): The material of claim 1 wherein said non-hydrolyzable, non-leachable polymer ~~chains are was~~ formed by polymerization of allyl- or vinyl-containing monomers.

12. (currently amended): The material of claim 11 wherein said allyl- or vinyl-monomers are selected from a group consisting of: styrene derivatives; allyl amines or ammonium salts[[,]] and the like.

13. (original): The material of claim 11 wherein said allyl- or vinyl-monomers are selected from a group consisting of: acrylates, methacrylates, acrylamides, and methacrylamides.

14. (currently amended): The material of claim 13 wherein said allyl- or vinyl-containing monomers are selected from the group consisting of: compounds of the structure $\text{CH}_2=\text{CR}-(\text{C}=\text{O})-\text{X}-(\text{CH}_2)_n-\text{N}^+\text{R}'\text{R}''\text{R}'''/\text{Y}^-$; wherein, R is hydrogen or methyl, n equals 2 or 3, X is either O, S, or NH, R', R'', and R''' are independently selected from the group consisting of H, C1 to C16 alkyl, aryl, arylamine, alkaryl, and aralkyl, and Y⁻ is an acceptable anionic counterion to the positive charge of the quaternary nitrogen; diallyldimethylammonium salts; vinyl pyridine and salts

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thereof; and vinylbenzyltrimethylalkylammonium salts and similar compounds.

15. (original): The material of claim 14 where said allyl- or vinyl-containing monomers are selected from the group consisting of: dimethylaminoethyl methacrylate:methyl chloride quaternary; and dimethylaminoethyl methacrylate:benzyl chloride quaternary.

16. (currently amended): A superabsorbent material for absorbing biological fluids, comprising a flexible substrate and an enhanced surface [[area]], said enhanced surface [[area]] comprising a multitude of non-hydrolyzable, non-leachable polymer of antimicrobial monomeric moieties chains covalently bonded by non-siloxane bonds to said flexible substrate so as to be[[;]] wherein said non-hydrolyzable, non-leachable polymer chains comprises a multitude of antimicrobial groups attached to said non-hydrolyzable[[,] and non-leachable polymer chains by covalent bonds; and wherein a sufficient number amount of said non-hydrolyzable, non-leachable polymer chains are is covalently bonded to sites of said flexible substrate to render the material antimicrobial when exposed to aqueous fluids, menses, bodily fluids, or wound exudates; wherein said superabsorbent material is capable of absorbing about 30 or more times its own weight of water or other fluids in a single instance; and wherein said absorbing capacity is the result of branching or crosslinking of said non-hydrolyzable, non-leachable polymer chains.

17. (currently amended): The material of claim 16, wherein said antimicrobial groups monomeric moities comprise at least one quaternary ammonium structure.

18. (currently amended): The material of claim 16, wherein said antimicrobial groups monomeric moities comprise at least one non-ionic structure.

19. (original): The material of claim 18, wherein said at least one non-ionic structure comprises a biguanide.

20. (currently amended): The material of claim 16, wherein said material comprises all or part of a wound dressing, sanitary pad, a tampon, an intrinsically antimicrobial absorbent dressing, a diaper, toilet paper, a sponge, a sanitary wipe, food preparation surfaces, gowns, gloves, surgical scrubs, sutures, needles, sterile packings, floor mats, lamp handle covers, bum dressings, gauze rolls, blood

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~~transfer tubing or storage container, mattress cover, bedding, sheet, towel, underwear, socks, cotton swabs, applicators, exam table covers, head covers, cast liners, splint, paddings, lab coats, air filters for autos planes or HVAC systems, military protective garments, face masks, devices for protection against biohazards and biological warfare agents, lumber, meat packaging material, or paper currency, and other surfaces in need of a non-leaching antimicrobial property.~~

21. (original): The material of claim 16, wherein said flexible substrate is comprised, in whole or in part, of cellulose, or other naturally-derived polymers.

22. (currently amended): The material of claim 16 wherein said flexible substrate is comprised, in whole or in part, of synthetic polymers ~~including, but not limited to: polyethylene, polypropylene, nylon, polyester, polyurethane, or silicone.~~

23. (original): The material of claim 16, wherein said attachment of said non-hydrolyzable, non-leachable polymer to said flexible substrate is via a carbon-oxygen-carbon bond, also known as an ether linkage.

24. (original): The material of claim 23, wherein a cerium-containing catalyst catalyzes formation of said ether linkage.

25. (currently amended): The material of claim 16 wherein said non-hydrolyzable, non-leachable polymer chains ~~are was~~ formed by polymerization of allyl- or vinyl-containing monomers.

26. (currently amended): The material of claim 25 wherein said allyl- or vinyl-monomers are selected from a group consisting of: styrene derivatives; allyl amines or ammonium salts[[:]] and the like.

27. (original): The material of claim 25 wherein said allyl- or vinyl-monomers are selected from a group consisting of: acrylates, methacrylates, acrylamides, and methacrylamides.

28. (currently amended): The material of claim 27 wherein said allyl- or vinyl-containing monomers are selected from the group consisting of: compounds of the structure CH₂=CR-(C=O)-

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X-(CH₂)_n-N⁺R'R"R'''//Y⁻; wherein, R is hydrogen or methyl, n equals 2 or 3, X is either O, S, or NH, R', R", and R''' are independently selected from the group consisting of H, C1 to C16 alkyl, aryl, arylamine, alkaryl, and aralkyl, and Y⁻ is an acceptable anionic counterion to the positive charge of the quaternary nitrogen; diallyldimethylalkylammonium salts; vinyl pyridine and salts thereof; and vinylbenzyltrimethylalkylammonium salts and similar compounds.

29. (original): The material of claim 28 where said allyl- or vinyl-containing monomers are selected from the group consisting of: dimethylaminoethyl methacrylate:methyl chloride quaternary; and dimethylaminoethyl methacrylate:benzyl chloride quaternary.

30. (original): An inherently antimicrobial composition comprising:

- a. a substrate; and,
- b. a coating, layer, or enhanced surface area on said substrate, comprised of a plurality of polymeric molecules of variable lengths bearing antimicrobial groups, wherein said polymeric molecules are covalently, non-leachably bound to said substrate, and wherein said coating, layer, or enhanced surface area exhibits antimicrobial activity due to the presence of said antimicrobial groups.

31. (original): The composition of claim 30, wherein said antimicrobial groups comprise at least one quaternary ammonium structure.

32. (original): The composition of claim 30, wherein said antimicrobial groups comprise at least one non-ionic structure.

33. (original): The composition of claim 32, wherein said at least one non-ionic structure comprises a biguanide.

34. (currently amended): The composition of claim 30, wherein said material comprises all or part of a wound dressing, sanitary pad, a tampon, an intrinsically antimicrobial absorbent dressing, a diaper, toilet paper, a sponge, a sanitary wipe, food preparation surfaces, gowns, gloves, surgical scrubs, sutures, needles, sterile packings, floor mats, lamp handle covers, burn dressings, gauze rolls, blood transfer tubing or storage container, mattress cover, bedding, sheet, towel, underwear, socks, cotton swabs, applicators, exam table covers, head covers, cast liners, splint, paddings, lab

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coats, air filters for autos planes or HVAC systems, military protective garments, face masks, devices for protection against biohazards and biological warfare agents, lumber, meat packaging material, or paper currency, and other surfaces in need of a non-leaching antimicrobial property.

35. (original): The composition of claim 30, wherein said flexible substrate is comprised, in whole or in part, of cellulose, or other naturally-derived polymers.

36. (original): The composition of claim 30 wherein said flexible substrate is comprised, in whole or in part, of synthetic polymers including, but not limited to: polyethylene, polypropylene, nylon, polyester, polyurethane, or silicone.

37. (original): The composition of claim 30, wherein said attachment of said non-hydrolyzable, non-leachable polymer to said flexible substrate is via a carbon-oxygen-carbon bond, also known as an ether linkage.

38. (original): The composition of claim 37, wherein a cerium-containing catalyst catalyzes formation of said ether linkage.

39. (original): The composition of claim 30 wherein said non-hydrolyzable, non-leachable polymer chains are formed by polymerization of allyl- or vinyl-containing monomers.

40. (currently amended): The composition of claim 39 wherein said allyl- or vinyl-monomers are selected from a group consisting of: styrene derivatives; allyl amines or ammonium salts[[;]] and the like.

41. (original): The composition of claim 39 wherein said allyl- or vinyl-monomers are selected from a group consisting of: acrylates, methacrylates, acrylamides, and methacrylamides.

42. (currently amended): The composition of claim 41 wherein said allyl- or vinyl-containing monomers are selected from the group consisting of: compounds of the structure $\text{CH}_2=\text{CR}-(\text{C}=\text{O})-\text{X}-(\text{CH}_2)_n-\text{N}^+\text{R}'\text{R}''\text{R}'''/\text{Y}^-$; wherein, R is hydrogen or methyl, n equals 2 or 3, X is either O, S, or NH, R', R'', and R''' are independently selected from the group consisting of H, C1 to C16 alkyl,

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aryl, arylamine, alkaryl, and aralkyl, and Y⁻ is an acceptable anionic counterion to the positive charge of the quaternary nitrogen; diallyldimethylalkylammonium salts; vinyl pyridine and salts thereof; and vinylbenzyltrimethylalkylammonium salts and similar compounds.

43. (original): The composition of claim 42 where said allyl- or vinyl-containing monomers are selected from the group consisting of: dimethylaminoethyl methacrylate:methyl chloride quaternary; and dimethylaminoethyl methacrylate:benzyl chloride quaternary.

44. (original): The antimicrobial composition of claim 43, wherein said substrate is a woven or nonwoven flexible matrix, and said composition is formed into the shape of a wound dressing.

45. (original): The antimicrobial composition of claim 43, wherein said coating absorbs aqueous liquids.

46. (original): The antimicrobial composition of claim 43, wherein said substrate is wood, lumber, or an extract comprising or a derivative of wood fiber.

47-50. (canceled)

51. (original): An antimicrobial-coated composition for destruction of microbes contacting said composition, comprising:

- a. a substrate onto which a coating of antimicrobial polymers is bonded; and,
- b. said coating, formed of an effective amount of polymeric molecules having a multiplicity of quaternary ammonium groups, wherein said polymeric molecules are non-leachably and covalently bonded to surface sites of said substrate, wherein said polymers do not form using siloxane bonds, and wherein said coating is absorbent of aqueous liquids,
whereby said multiplicity of quaternary ammonium groups act to destroy microbes coming in contact with said groups.

52. (new): The material of claim 1, wherein said antimicrobial monomeric moieties are bound to one another via covalent chemical bonds selected from the group consisting of carbon-carbon bonds, carbon-oxygen bonds, and carbon-nitrogen bonds.

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53. (new): The material of claim 1, wherein said flexible substrate is a woven fabric.
54. (new): The material of claim 1, wherein said antimicrobial monomeric moieties comprise dimethyldiallylammonium chloride, also known as DADMAC.
55. (new): The material of claim 1, wherein said material further comprises an indicator that indicates a condition or status based on an aspect of said absorbed biological fluids.
56. (new): The material of claim 1, wherein said material further comprises a hemostatic agent.
57. (new): The material of claim 8, wherein said flexible substrate is polyethylene, polypropylene, nylon, polyester, polyurethane, or silicone.
58. (new): The material of claim 8, wherein said flexible substrate is a nonwoven.
59. (new): The material of claim 16, wherein said antimicrobial monomeric moieties are bound to one another via covalent chemical bonds selected from the group consisting of carbon-carbon bonds, carbon-oxygen bonds, and carbon-nitrogen bonds.
60. (new): The material of claim 16, wherein said flexible substrate is a woven fabric.
61. (new): The material of claim 16, wherein said antimicrobial monomeric moieties comprise dimethyldiallylammonium chloride, also known as DADMAC.
62. (new): The material of claim 16, wherein said material further comprises an indicator that indicates a condition or status based on an aspect of said absorbed biological fluids.
63. (new): The material of claim 16, wherein said material further comprises a hemostatic agent.
64. (new): The material of claim 22, wherein said flexible substrate is polyethylene, polypropylene, nylon, polyester, polyurethane, or silicone.
65. (new): The material of claim 22, wherein said flexible substrate is a nonwoven.

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66. (new): The composition of claim 30, wherein said antimicrobial monomeric moieties are bound to one another via covalent chemical bonds selected from the group consisting of carbon-carbon bonds, carbon-oxygen bonds, and carbon-nitrogen bonds.

67. (new): The composition of claim 30, wherein said antimicrobial monomeric moieties comprise dimethyldiallylammonium chloride, also known as DADMAC.

68. (new): The composition of claim 30, wherein said substrate is a woven fabric.

69. (new): The composition of claim 30, wherein said substrate is a nonwoven.